

Remarks/Arguments

Reconsideration of this application is requested.

Specification

The title is objected to as not descriptive. In response, the title is amended to "Semiconductor Device with External Terminal Joined to Concave Portion of Wiring Layer", which is clearly indicative of the invention to which the claims are directed.

Claim Status

Claims 1-20 were previously presented. Claims 15-20, which are withdrawn from consideration as a result of the previous restriction and election of claims 1-14, are canceled without prejudice. Claims 1-3 and 9-11 are amended. Claims 1-14 are now pending.

Allowable Subject Matter

Claims 2, 3, 10 and 11 are indicated as allowable if rewritten in independent form. Claims 2 and 3, which depend directly from claim 1, are rewritten into independent form including all limitations of base claim 1. Claims 10 and 11, which depend directly from claim 9, are rewritten in independent form including all limitations of base claim 9. Accordingly, claims 2, 3, 10 and 11 are now in allowable form.

Claim Objections

In claim 10, "with" is inserted before "a depth" as suggested in the Action.

Claim Rejections – 35 USC 103

Claims 1, 4-6, 9 and 12-14 are rejected under 35 USC 103(a) as obvious over Hwang (US 6,455,408) in view of Hsuan (US 6,166,444). Claims 7 and 8 are rejected as obvious over Hwang, Hsuan and Farnworth (6,767,817).

Claims 1 and 9 are independent and are directed to a semiconductor chip or wafer provided with an integrated circuit, wherein a pad of the integrated circuit is electrically connected to a wiring layer that has a concave portion. An external terminal is joined to the concave portion, and a resin layer is disposed on the wiring layer and has a through hole at the same position as the concave portion.

Hwang discloses a semiconductor wafer 50 having chip pads (54), a redistribution pattern (64) having a concave pattern (68), an external terminal (80) (solder bump) that is joined to concave pattern (68), and a resin layer (74) disposed on redistribution pattern (64) and provided with a through hole at the same position as the concave pattern. (*See, Hwang; Figs 16 and 17*).

However, Hwang's redistribution pattern 64, which the Action asserts corresponds to applicant's claimed "wiring layer", is disposed between lower barrier metal layer 60 and upper barrier metal layer 70. And, an additional barrier metal layer 78 is interposed between terminal 80 and barrier metal layer 70. Thus, Hwang's external terminal 80 is not directly connected to the concave portion formed in "wiring layer" 64, rather, barrier metal layers 70 and 78 are interposed between terminal 80 and wiring layer 64. (*See, Hwang; Figure 17*). In the present invention, by contrast, external terminal 28 is directly connected to concave portion 26 formed in wiring layer 20 (see applicant's Fig. 3). As explained in paragraph [0046] of applicant's specification, this increased and direct contact between wiring layer 20 and external terminal 28 improves bonding strength and electrical connectivity.

The secondary reference Hsuan suffers from the same deficiencies: "bump" 56 is coupled to barrier and coated layers 50 and 52. Farnworth is cited only for its disclosure of a circuit board, and does not remedy the deficiencies of Hwang and Hsuan.

In view of this difference, claims 1 and 9 are amended to require that the external terminal is directly joined to the concave portion of the wiring layer without any intervening layers. Since this feature is not disclosed or suggested by any combination of Hwang, Hsuan and Farnworth, the rejections of claims 1, 4-9 and 12-14 under 35 USC 103 should be withdrawn.

Appl. No. 10/803,178
Amdt. dated December 28, 2005
Reply to Office Action of October 4, 2005

Atty. Ref. 81754.0114
Customer No. 26021

Double Patenting

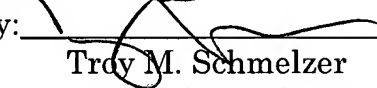
Claims 1, 4-6, 7-9 and 12-14 are subject to a provisional double patenting rejection over claims 12-27 of copending application no. 10/801,093. A terminal disclaimer is enclosed to overcome this rejection.

Conclusion

This application is now believed to be in condition for allowance. The Examiner is invited to telephone the undersigned to resolve any issues that remain after entry of this amendment. Any fees due with this response may be charged to our Deposit Account No. 50-1314.

Respectfully submitted,
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Date: December 28, 2005

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